

## CLAIMS

What is claimed is:

1. An apparatus for thermal testing of one or more samples, said apparatus comprising:  
5           a single sample chamber;  
          a cooler and a heater to vary a temperature of a fluid;  
          an opening in said chamber for introduction of said fluid; and  
          a plurality of sample mounts for receiving the one or more samples circularly arranged  
around said opening;  
10           wherein the fluid varies temperature of the one or more samples.
2. The apparatus of claim 1 wherein the temperature is lower than an ambient temperature.
3. The apparatus of claim 1 wherein the temperature is higher than an ambient temperature.
- 15   4. The apparatus of claim 1 wherein said fluid comprises air.
5. The apparatus of claim 4 wherein said air is dried.
- 20   6. The apparatus of claim 5 wherein said air is compressed.
7. The apparatus of claim 1 wherein said fluid is cooled to a temperature lower than a desired low temperature.
- 25   8. The apparatus of claim 7 wherein said cooled fluid is subsequently heated to the desired low temperature.
9. The apparatus of claim 8 wherein said cooled fluid is subsequently heated to a desired high temperature.
- 30   10. The apparatus of claim 1 wherein said sample mounts are evenly spaced.

11. The apparatus of claim 1 wherein sufficient space exists between the one or more samples mounted in adjacent said sample mounts to permit uniform flow of said fluid.

12. The apparatus of claim 1 wherein said sample mounts comprise slots to receive the one or more samples.

13. The apparatus of claim 12 wherein said slots are oriented radially outward from said opening.

14. The apparatus of claim 1 wherein said fluid flows radially outward from said opening.

15. The apparatus of claim 1 wherein said sample mounts comprise electrical connectors.

16. The apparatus of claim 15 wherein said electrical connectors comprise an electronic switching network.

17. The apparatus of claim 16 wherein said network comprises at least one precision ohmmeter.

18. The apparatus of claim 17 wherein said network is in communication with a computer or processor.

19. The apparatus of claim 18 wherein said computer or processor comprises a data acquisition system.

20. The apparatus of claim 1 wherein the samples comprise test coupons.

21. The apparatus of claim 20 wherein the test coupons comprise at least one net.

22. The apparatus of claim 21 wherein the at least one net comprises a daisy-chain of vias.

23. A method of performing thermal testing of one or more samples, the method comprising the steps of:

stabilizing the one or more samples at a first desired temperature and measuring a first resistance of the one or more samples once stabilized;

5 stabilizing the one or more samples at a second desired temperature and measuring a second resistance of the one or more samples once stabilized;

determining a first duration starting from the second resistance for the one or more samples to reach the first resistance;

10 determining a second duration starting from the first resistance for the one or more samples to reach the second resistance; and

subjecting the one or more samples to a plurality of temperature cycles ranging between the first desired temperature and the second desired temperature, wherein a temperature of the one or more samples is changed for the first duration in order for them to reach the first desired temperature and the temperature of the one or more samples is changed for the second duration in order for them to reach the second desired temperature.

24. The method of claim 23 wherein the stabilizing steps are performed before the determining steps.

25. The method of claim 23 wherein the subjecting step comprises performing a predetermined number of the cycles.

26. The method of claim 25 further comprising the step of determining a number of the one or more samples which have failed after the predetermined number of cycles have been performed.

27. The method of claim 23 wherein a number of the one or more samples which have failed is monitored during the subjecting step.

28. A thermal shock test performed according the method of claim 23.

29. A method of thermally testing one or more samples, the method comprising the steps of:  
varying a temperature of the one or more samples until the temperature is stabilized at a  
desired temperature and measuring a stabilized resistance of the one or more samples at the desired  
temperature;

5 determining a duration for the one or more samples to reach the stabilized resistance  
correlated with the desired temperature; and

changing the temperature of the one or more samples for the duration so that they reach  
the desired temperature.

10 30. The method of claim 29 wherein the determining step is performed after the varying step is  
performed for at least two desired temperatures.

31. The method of claim 30 wherein the determining step is performed for each of the at least two  
desired temperatures.

15 32. The method of claim 31 wherein the duration to reach a stabilized resistance correlated with a  
desired temperature is measured from when a resistance of the samples has a value correlated with a  
different desired temperature.

20 33. The method of claim 32 wherein the changing step is repeated alternating between each of the at  
least two desired temperatures.

34. The method of claim 30 wherein the determining step is repeated until at least two measurements  
of the time for the one or more samples to reach the stabilized resistance correlated with the desired  
25 temperature are within a predetermined error interval.

35. The method of claim 29 wherein the determining step is repeated until at least two measurements  
of the stabilized resistance for the desired temperature are within a predetermined error interval.

30 36. A thermal shock test performed according to the method of claim 29.